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ABSTRACT

A model for designing efficient teacher training in computer literacy and usage should begin with preplanning to consider the goals, objectives, and purposes of the training; the needs of the teacher/student; the content and sequence of information to be taught; and careful evaluation procedures for use in further planning. Planners must recognize that teachers may have psychological, mathematical, mechanical, and professional fears concerning the computer and their own abilities. A needs assessment can determine both what teachers want to know and what they need to know. Assessment questions for teachers should focus on introduction to the microcomputer, the effect of computers on society and education, and what knowledge and skills are needed to make effective use of microcomputers in the classroom. The training should include sessions covering: (1) an introduction to the computer and an overview of the state of the art; (2) planned instruction in computer literacy; (3) systematically-designed programs for individual instruction; (4) techniques for working with children in the classroom; and (5) knowledge of the administrative uses of the computer. This report includes a sample teacher questionnaire for assessing training needs and a 27-item bibliography. (LMM)

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A MICROMPUTER TRAINING MODEL FOR TRAINING TEACHERS

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A MICROCOMPUTER TRAINING MODEL FOR TRAINING TEACHERS

"It was the best of times; it was the worst of times"

When Charles Dickens used these words to begin his book, A Tale of Two Cities, he was describing the background against which the events leading to the French Revolution were to be played. It was a time when giant strides in technology were calling for drastic revisions in industry and society. It was a period in which changes were so rapid that the common man had difficulty adjusting to the new requirements being imposed on him. He reacted by attempting to destroy the society which was making demands upon him for which his experience or his education had not provided him the tools with which to cope. Toffler must have had a similar thought in mind when he wrote Future Shock, a book written in 1970 and which seems chillingly fortuitous to us today.

The increasing interest in the microcomputer as an important component of the educational program has caused many educators to view it as an explosion which, when the debris settles, will lead to vast and sweeping changes in our educational process. To meet these future demands teachers are being asked to become "computer literate" in what seems to them to be overnight. Their reactions have been varied and expected--positive and negative. It is evident that opportunities are needed which will prepare teachers quickly and efficiently in those skills which are

most needed by them in the classroom. Identifying those skills and planning experiences that will enhance teacher capability is the primary task of training programs in computer literacy and usage. The task of implementing such programs has become, in most areas, the responsibility of the principal or director who my not have the capability to design and implement such a program and must, therefore, depend upon the expertise of others. The purpose of this paper is to offer suggestions for training sessions that will lead to effective teacher preparation and to provide guidelines for those wishing to provide microcomputer training for their teachers.

PRE-PLANNING

In designing a model for teacher training, consideration must be given to several key elements before the program is implemented. These components include goals, objectives, and purposes of the training; the needs of the teacher/student; the content and sequence of information to be taught; and careful evaluation procedures for use in further planning.

Because educators lack the expertise to conduct computer educational programs, training in many areas is being conducted inservice through consultants from computer science departments of local institutions of higher learning, hoppyists who have taught themselves how to use the microcomputer, computer vendors who promote their own hardware, an a few educators who were quick to see the need for providing such a service and sought the necessary training to acquire the needed skills. Presentations by consultants are still the

principal means for educating large numbers of teachers, especially in early childhood. In far too many instances, few guidelines are given the expert conducting the training, therefore, the program is designed and implemented according to what the consultant judges to be the needs of the audience. The consultant may be successful and meet those needs or may intensify the fears and uncertainty already felt by the participants. Skills in teaching are sometimes lacking when the sessions are conducted by non-educators. The salesman for a large computer firm may know his computer, but be unable to communicate the knowledge, skills, and abilities needed by the classroom teacher. An expert on computers is not necessarily an expert on teaching. Selection of the right person to conduct the sessions is an important step in insuring that the workshop will be effective.

As in selecting a consultant for any other assignment, look at his/her record. What is the background of experience and/or training of the proposed consultant? Has he/she done previous computer workshops or training sessions, particularly with teachers? If so, when and to whom? If possible, talk to some of the participants in these sessions. What were the strong points, weak ones of the presentation? How well did the trainer relate to the audience? Was he/she able to present the information in a manner readily comprehended by the attendees? How were questions handled and was participation actively encouraged? Although prior experience is no guarantee of future success, it can do much to guide

you in setting up your own program and in ensuring that the individual selected will be capable of providing the precise type of training needed.

To maximize the use of the consultant, sponsors for the training sessions should do their homework, that is, to do this--administrators must provide a framework in which the training is to operate. They must have some understanding of their staff and their needs. Planners must recognize the fear that exists among most teachers--fear that may be psychological, mathematical, mechanical, or professional. Psychological fear has to do with being thought stupid. Teachers are persons who conduct learning and sometimes have difficulties when the role is reversed and they must then become the learner. Many teachers fear that they can not be trained fast enough. Recognizing the importance of protecting the self-concept of teachers, trainers will see that teachers and materials are matched according to levels of understanding and paced to their abilities.

Mathematical fear has to do with teachers' perception of their mathematical ability. Some teachers approach the computer with the same trembling and aversion that they do mathematics courses. Assuring that verbal skills are more important initially than mathematical ones helps to relieve some of this anxiety for many teachers.

Mechanical fear, that is, anxiety about ability to manipulate the machine can be relieved through role playing the parts of the computer as suggested by Heller and Martin (1982) and by drawing attention to similarities with the

mechanical operation of microwave ovens, the typewriter, and the calculator. Many computer training sessions begin with a simulation of how a computer works. By using people to represent the parts of the computer, the students can be shown how the microcomputer processes information. If used skillfully, this procedure can be very effective. Care must be given, however, that the participants do not get so caught up in the "fun" of the experience that important learning connections do not take place. It is important for students to go immediately from the role playing to identification of those parts with an actual computer. Sometimes this is not done and participants have difficulty relating their learning to the computer itself. A humorous example of the importance of relating the simulation to the actual computer has often occurred when one of the participants in a workshop sometimes becomes distressed when the disk is removed. It takes some convincing to assure him that once the information is in the computer the disk is not needed.

The fear that the computer will undermine their profession by taking over the teaching function is a view widely held by many teachers. Discussions which emphasize the "state of the art" in regard to education programming, the advantages and disadvantages of the use of computers, and the non-availability of computers for every child will help to put fears into their proper perspective. We are a long way from replacing all of our teachers with computers. What teachers can be helped to see is the usefulness of the computer as a tool for learning, and its potential for individ-

ualizing instruction.

In addition to recognizing fears and attitudes toward the acquisition of computer knowledge, planners must determine what it is that teachers want to know and what they need to know. Sometimes these two things are not the same. Over-zealous administrators may see the need for teachers to write computer programs for their classes while the teacher may see her need as to be able to find the right button to push to start the program. Feedback from numerous workshops indicate that teachers want to know, above all else, what the computer can do. They are often more interested in this than how the computer works. They want to know what is being done in the educational field--the state of the art--and how it will impact upon their classrooms. They want to know how important it is for them to get involved and how best to do so. They want to know where they can get the competencies needed to function effectively, and they want to know ways to teach children. Those persons conducting workshops will soon find that a time for questionning and discussion must be built into the training. Because of the expense of hiring a consultant, many administrators have a separate time for discussion apart from that time when a consultant is present. These additional sessions may be conducted by a staff member who has had some training. Ideally, questions should be answered at the time they occur for two reasons. Sometimes a small bit of information can help teachers move ahead. If this knowledge is not supplied, attention stays with the problem rather than focusing upon the next piece of informa-

tion. Another reason is that the consultant is an expert in the field and should be able to answer the question in such a way that understanding occurs. When questions are delayed to a later session, they are sometimes not answered as well, may be forgotten; or may even be answered incorrectly. Meeting the needs of the participants at the appropriate time can lead to a clearer and faster attainment of concepts by teachers and at the same time alleviate some of their fears.

The best way to decide what information is needed by a given group is to do a needs assessment. A simple questionnaire which determines the background of the participants and their needs would assist in planning by enabling administrators to mesh their goals with those of their teaching staff. It would also define where the focus of the material to be presented is to be placed. This knowledge gives a clearer idea of the group's expectations. Many workshops are rated "poor" by their participants because they are above or below the ability level of the majority of the audience. Asking a few questions during the planning phase of the training can insure a session where participants feel that the knowledge they are acquiring is beneficial and maybe even exiting. A simple questionnaire might include questions regarding experiences with computers, ownership of them, and utilizing them in the classroom. In addition, participants could identify those topics that they would find the most beneficial. (See example questionnaire.)

QUESTIONNAIRE

Teacher Background of Experiences

We are planning a workshop (series of workshops) to acquaint our staff with the use of the microcomputer. Will you please take a few minutes to answer the following questions?

1) What experiences have you had with computers? Describe.

2) Do you own a personal computer?

If so, how did you learn to use it?

3) Do you utilize a computer in your classroom? If so, how?

4) Which of these topics would benefit you most?

Rank them with 1 being the most useful.

_____Introduction to the microcomputer

_____Educational software available

_____How a computer works

_____History of the computer

_____How computers are used

_____Programming in BASIC

_____Administrative uses of the computer

ESTABLISHING GOALS AND OBJECTIVES

Having tabulated the responses, the sponsors of the training will next want to decide what the goals and objectives of the session(s) will be. (These goals should always be set by those wishing the training rather than by the consultant.) A personal interview or a telephone conversation with the consultant where the goals are discussed insures that both parties understand what outcomes are expected. Concepts to be learned should be clearly defined and in keeping with previously determined goals. It is the consultant's responsibility to see that experiences are provided which teach key concepts, give examples and non-examples of the information to be acquired, and provide some means for testing the participants' learning. Testing may include a pre and post attitude survey; tests of knowledge, and tests of performance (i.e., writing a simple program).

In establishing goals it is generally conceded that information is needed in regard to what are computers, how they work, their affect upon society; their impact upon education; their use both instructionally and administratively, the software available, and the language and process skills needed for utilizing and operating them. Training sessions should provide answers to keep questions as determined in pre-planning sessions. The following concerns of educators can assist in guiding the development of needed questions.

QUESTIONS FOR DEVELOPING OBJECTIVES

I. Introduction to the Microcomputer

A. What is a microcomputer?

B. What are the main parts of a computer and how do they function?

C. How is a computer used?

D. What is a program?

E. What is hardware and software?

F. What are computer and program limitations?

G. What is a computer language?

II. What is the effect of computers on society and education?

A. What is the "computer revolution?"

B. How will the increased use of computers affect classroom teaching?

C. How can computers be used to enhance education?

D. Who will establish to what uses the computer will be put in the classroom?

E. Who will determine how much time will be spent on computer related activities?

III. What knowledge and skills are needed to make effective use of microcomputers in the classroom?

A. What are the expectations required of teachers for computer literacy and usage?

B. Will everyone be required to write their own programs?

C. How can the knowledge and skills needed for using the computer be obtained?

D. What resources are avilable to the teacher for self-education and/or practice?

COMPONENTS OF TEACHER TRAINING SESSIONS

A model for teacher training for use of the microcomputer in the classroom must have five major components--an introduction to the computer and an overview of the state of the art; planned instruction in computer literacy; systematically designed programs for individual instruction; techniques for working with children in the classroom; and knowledge of the administrative uses of computers. Whereas each of these components can be treated separately, more effective preparation of teachers must use them all.

Content, format, and time allocated for training is determined by the purpose of the training. Purposes may be of an introductory nature given in a short period of time or an extensive course in the BASIC language encompassing a longer time frame. A short session of three or four hours might be for those teachers with experience who wish the opportunity to view hardware and software and/or learn techniques for working with children. A day spent viewing and introducing teachers to the use of management systems would benefit those teachers who have some previous training or would like to know more about administrative uses of the computer by the teacher. Computer competency does not occur overnight. Instruction must address a wide range of interests, needs, and various levels of ability.

I. Introductory Session. Introductory sessions should include an overview session for participants to become acquainted with the microcomputer, and an examination of its affect upon education and society, a demonstration of

computer capabilities, skills in the mechanical operation of the computer, and an examination of samples of different software. In addition, key vocabulary terms must be explained and demonstrated and students given a few terms and commands for operating the machine when using commercially prepared software.

This type of training is best presented in a workshop format which is informal and nonthreatening. Limiting the session to a maximum of twelve participants allows involvement through observation, questions, and experimentation. It is important that more than one computer be available for the workshop. A hands-on experience where each person can use his own machine is ideal, but this is not often practical for many educational settings. Asking more than six persons to share a computer during a workshop does not allow for good visibility and interaction. Where computers are not sufficiently available in the educational setting, they can be borrowed from enthusiastic computer users in the community. Often computer club members or hobbyists are happy to come to a session and bring their computers for demonstration.

Another advantage of using hobbyists or members of a local computer club is that their enthusiasm for the computer can be contagious. Although such individuals may tend initially to intimidate the group with their knowledge, the participants will soon realize that most of these individuals are not computer professionals and have, in most instances, gained their skill through working with the computer

at their own pace. This is perhaps the best proof available that the computer can be mastered and used by individuals with a wide variety of training, interests and experience. This will also serve to demonstrate that many innovative uses of small computers are developed by amateur computerists ranging from programs relating to their hobbies such as keeping track of bowling scores, stamp or coin collections, etc. to those that teach math concepts, do word processing, play games, predict the weather or run a model railroad.

Teachers who have had some previous training can also be asked to assist the consultant. Having the presence of others knowledgeable about computers is an asset to the consultant who can not be everywhere at once. It also allows for an increased number of participants involved in the training as special attention can be given them. Training sessions where small groups run different programs and then rotate are very effective means for showing a variety of software and acquainting users with the "idiosyncracies" built into some programs. Simple programs can also be demonstrated by the consultant first and then tried out by participants in small groups which are supervised by assistants.

The amount of time and the number of sessions spent on introductory training sessions is dependent upon the needs of the group, the time felt by planners that could be devoted to it, and the availability of resources--financial and human. Less than six hours hardly gives time for more

than a cursory look at computers and does not allow time for participants to start to feel comfortable with the use of them. There is not sufficient time for students to become instant programmers. Skills needed for doing programs beyond a few lines are not emphasized in the introductory workshop.

Least effective training sessions are two or three hour workshops with no follow through later. Instead of allaying tensions and creating interest and excitement, these workshops can cause further anxiety and tension. Planners who give attitude assessments pre- and post- should not be too dismayed to see less enthusiasm among some teachers after the too short workshop. Sometimes participants are overwhelmed with the enormity of it all.

A longer period of time would allow such topics to be included as a brief history of computers, criteria for selecting hardware and software, and resources for classroom teachers who wish to know more about computer usage.

II. BASIC Language and Logo. Instruction in the BASIC language is an important component in providing teacher training in the use of the microcomputer. Although many crash courses in BASIC have been successfully given to teachers, a longer period of time allows participants to assimilate the information and do some much needed practice before the next concept is introduced. Time is needed to learn the terms, programming processes, and the mechanical operation of the computer. Teachers vary in their ability to assimilate new information, the time they are able to

spend in practice, and interest in using their time in this way. Time must also be allowed for getting used to the keyboard. Oddly enough, many teachers do not type and are, therefore, slower at inputing information and computer keyboards frequently vary in layout from those of a standard typewriter. Tasks should be done several times with slight modifications to insure learning. A two hour session for sixteen weeks, or the equivalent of one college course would enable students to acquire the rudiments of programming and allow for individual practice and assimilation.

III. Providing for Individual Instruction. A microcomputer training model for teachers must provide for individual work with the computer used in that particular center or school. Ideally, some portion of the group training time would be devoted to getting students started with the operational use of the computer, however, individual practice sessions are needed to give them time for exploration and experimentation.

Tutorial guides and programs as well as program operating manuals allow students to familiarize themselves with the operation of particular computers and their unique features. There are many advantages in using these kinds of planned experiences. They offer the student an opportunity to interact with the computer at a time that is convenient for him. Most programs are self-paced so that users can proceed at their own rates. Some computer tutorial programs allow the levels of the program to be varied. Others ask the student if they wish the material to be repeated.

Concepts are explained, examples are given, and graphic displays are used to present concepts in an interesting, visual way.

Printed guides and manuals have the advantage of student control of material to be entered. The user can start at any point and stop when the material is learned. It is also easier to clear out the information not needed or already learned. Changes are easier to make than with a commercial program on disk and tape as the user has access to the listing for the program.

Disadvantages also exist with the use of both tutorial computer programs and guides. Many programs do not give enough examples nor do they provide opportunities for students to try out newly acquired information. Some computer tutorials are difficult to get back to the menu or beginning of the program. Others do not allow students to review needed information for problem solving. Students need a pencil and paper handy which negates the effectiveness of the program as a tutorial. Still other tutorials and guides lock a student into a question without means of exit other than going back to the beginning of the program. A student can not, therefore, enter some programs at that line number, however, many programs are locked or made impossible to either go forward or backward except as the program dictates.

Instructions for running some of the programs are sometimes not clear to the novice user. Programs sometimes have special settings that must be used that may vary from a given computer's usual procedure. For example, some

programs require a specific volume setting on the tape recorder for loading and will not load at the setting usually used by that computer.

The use of file cards with short programs for teachers to try is an excellent way for students to work independently with the computer. Included on the cards should be an objective for the program which is the teaching of a specific concept. Some of these cards might include the use of terms such as CLS, Enter (Return), Break, Run, and New. A few commands will allow users to write a simple program, i.e., Print commands, Input command, if-then and For-Next statements. Conventions such as numbering could be demonstrated as well as some of the editing functions. As the student becomes more proficient, he will want to try writing simple programs. In the beginning technical discussion should be limited. Tasks requiring the user to make simple responses are useful. Emphasis should be upon usage rather than programming. Students should be given experiences that will allow them to see immediately the need for the instruction. Examples should be directly applicable to the teacher's experiences. Many participants lose the computer concept being taught in their struggle with the math. Ones which demand math skills that make teachers concentrate on math formulas or procedures detract from the computer concept to be learned and are best left for a later time. An example of this occurs with math problems which have to be converted from standard measures to metric ones.

A room designated as a computer laboratory room manned by someone trained in the use of microcomputers is an asset

to a school whose teachers are beginning to use a microcomputer. The availability of someone to answer questions can assist students to not become frustrated or anxious during the learning period. Feedback will help them to improve their skills.

Training for Working with Children

After the teacher has received training in learning to use the computer and practice sessions provided, additional workshops should be devoted to strategies for working with children within the classroom. Just as all good educational programs set goals and objectives, teachers must first identify key concepts to be taught so that educational goals can be set, carried out, and evaluated. A productive way of doing this is to form committees to examine instructional concepts and objectives already established within the different disciplines and then to make decisions as to how the computer can be used to meet them. Likewise those concepts needed for children to become familiar with the computer need to be clearly defined and objectives set for acquiring computer literacy. It is important that the whole school be involved in this activity so that a sequence of instruction can be designed throughout the grades. Determining a tentative sequence of instruction early insures that a broader range of instruction will be obtained.

Time to examine existing resources will have to be part of the training of the teacher for using computers with children. Sessions conducted by a panel of classroom

teachers who have used different types of programs in an educational setting can offer useful insights for teachers who are just beginning. A call to the local school board or to principals of other schools can assist in identifying those persons who might be willing to come and share their knowledge with other teachers.

Teachers will also need to spend time previewing programs for possible implementation in the classroom. Criteria will need to be established for software evaluation and for suitability of use. Software can be obtained for viewing from suppliers, other schools, and from hobbyists. Journals and magazines offer short programs which can be put into the computer and saved for evaluation by the group.

To choose goals that best meet the needs of their students, teachers will need to view software from a variety of different types of programming. Programs for instructional usage would include drill and practice, simulation, games, and other computer assisted instruction. Tutorials would be needed to assist children in learning to operate the computer. Programs would be carefully matched to meet the goals and needs of the students and the total educational curriculum. It is better to have one software package that meets its intended goals than to have three or four that only partially meet them. Careful attention needs to be made to the concepts being taught. It is very easy to be taken in by the "cuteness" of a program only to discover later that the instructional message is lost or is not what is needed. This becomes a very expensive lesson.

Strategies for using the computer in the classroom will have to be determined next. It is important that the computer not be just left in the classroom without a planned program for instruction. The teacher needs to stay in control of the use of it and must, therefore, establish rules in regard to it. A checklist can be designed with other teachers that will show which programs have been used by children to learn which specific concepts. Techniques for teaching the children can be brainstormed with other teachers who have had experiences with the educational use of the microcomputer. Readings which report activities done by other teachers with children should be read and discussed. These articles and books offer much useful information in working with children in a variety of ways. Many "pitfalls" can be avoided by becoming aware of the experiences that other educators have encountered. Suggestions for guiding instruction, how to begin to use the microcomputer, and monitoring progress can be obtained through carefully selected reading materials.

Administrative Uses of the Computer

Many teachers find that several sessions devoted to the administrative uses of the computer to be beneficial. A presentation made by a consultant or representative from one of the computer suppliers who is trained in demonstration of their software offers teachers a chance to see and evaluate programs. Time for discussion of ways to utilize these programs in their individual settings should

be provided as well as opportunities to try them out. Teachers should be given opportunities to explore prepared authoring systems and their use in construction of educational programs. An introduction to one of the data based management packages is very informative for the classroom teacher, who will probably find it an extremely useful tool.

Many computer magazines offer descriptions of programs for administrative use. Some articles are available which critique the programs, therefore, giving needed information as to problems that may occur with usage of the program as well as extolling their virtues. Sharing of the findings of these readings can lead to better understanding of the program's potential.

Decisions as to which programs to purchase should be also be made by a group of teachers. Criteria should be established based upon need and matching the program to suit that need. As many of these programs are very expensive, careful selection is a must if they are to be useful. Attention should also be given in regard to ease of learning to use the program. Some programs have directions that are unclear and difficult to follow. In addition, some suppliers are not able to answer needed questions when problems arise. It is important that before purchasing the package that it be tried out by someone unfamiliar with it so that potential problems can be identified and solved.

A school will wish to select administrative computer programs which offer as many features as possible so that

they appeal to and are utilized by many teachers as for example, programs which assist in test construction, averaging of grades, or roll keeping. Teachers who have learned to use these programs are generally enthusiastic about them and are more willing to attempt instructional assistance ones.

Conclusion

The best of times? The worst of times? I like to think they are times when educational theories and practices can be re-examined. It is a time for rethinking of traditional learning programs and for considering the influences that new technology can make toward quality education for young children. Just as the Child Study Movement caused educators to consider the child and his environment, we are being challenged to do the same. There is no question that computers are with us and are having profound effect upon our lives. Providing opportunities for children to learn to know and use computers as part of the Early Childhood curriculum requires teachers who can understand and use them with knowledge, confidence, and skill It also places responsibilities upon teachers to establish criteria for usage, to be critical of the use of the computer for activities better left for older children, and to speak out against "gimmick" learning. Using the computer with children requires teachers who continue to see the total child in the best of all learning environments. Something that good teachers have a[illegible]s done.

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